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Biological control activities against Dalmatian toadflax  
and leafy spurge on U.S. Forest Service lands (AZ, MT,  
NV)

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**ANNUAL REPORT - 1997**

**BIOLOGICAL CONTROL ACTIVITIES AGAINST DALMATIAN TOADFLAX AND  
LEAFY SPURGE ON U.S. FOREST SERVICE LANDS (AZ, MT, NV)**

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FINAL REPORT FOR CHALLENGE COST SHARE AGREEMENT  
#INT-95117-CCSA  
Development of a Forest Service Rearing Program  
for Biological Control Agents for Dalmatian  
and Yellow Toad Flax"  
MONTANA STATE UNIVERSITY  
FS Contact: Dr. George P. Markin  
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I. Deer Lodge National Forest, Boulder, MT.

A. Biological control efforts against Dalmatian toadflax and yellow toadflax in 1997.

Cooperator: Ron Gibson, Deer Lodge National Forest, Boulder, MT

Releases of the defoliating moth, *Calophasia lunula* for biological control of Dalmatian toadflax were continued in 1997 on the Deer Lodge National Forest near Boulder, Montana. Sufficient numbers of the moth were generated in May to be able to make a field release in early June. Two shipments of *C. lunula* larvae were sent to Ron Gibson for release at Dalmatian toadflax sites of his choice. The first shipment was sent on June 9, 1997 containing 100 larvae, and the second was sent on June 16, 1997 containing 700 larvae. While reattaching the skin to the insect cage at the Elkhorn site in mid May no evidence of *C. lunula* from the previous years release could be seen.

Releases of the flower-feeding beetle, *Brachypterolus pulicarius* were continued in 1997 on the Deer Lodge National Forest. Efforts to collect *B. pulicarius* from toadflax sites in Montana in mid summer were highly successful. One-thousand adult *B. pulicarius* were shipped to Ron Gibson on July 23, 1997 for release on the Deer Lodge National Forest, at Dalmatian toadflax sites of his choosing.

Plant vegetation analyses were continued at the release site one mile west of Boulder in 1997, so that the impact of biological control agents on Dalmatian toadflax could be documented in the future. Twenty Daubenmire frame samples, each a tenth of a square meter, were taken along a twenty meter transect at one meter intervals, for a total of twenty samples. Plant information taken included the density of Dalmatian toadflax, and percent cover of Dalmatian toadflax, grasses, forbs, shrubs, and percent bare ground (Table 1). Comparisons of the six informational categories over the past three years are depicted in Figure 1.

B. Biological control efforts against leafy spurge.

On July 16, 1997, 6,000 flea beetles (*Aphthona nigriscutis*) were collected from our insectary sites and shipped to Ron Gibson for release against leafy spurge.

Table 1. Density and/or percent cover estimates of Dalmatian toadflax, grasses, forbs, shrubs and bare ground at the Boulder site summer, 1997.

Transect	D. toadflax density	D. Toadflax % cover <sup>1</sup>	Grass % cover	Forb % cover	Shrub % cover	Bare Ground % cover
One <sup>2</sup>	1.05 $\pm$ 0.45 <sup>3</sup>	0.50 $\pm$ 0.34	13.20 $\pm$ 2.09	13.50 $\pm$ 2.64	0.00 $\pm$ 0.00	72.80 $\pm$ 2.64

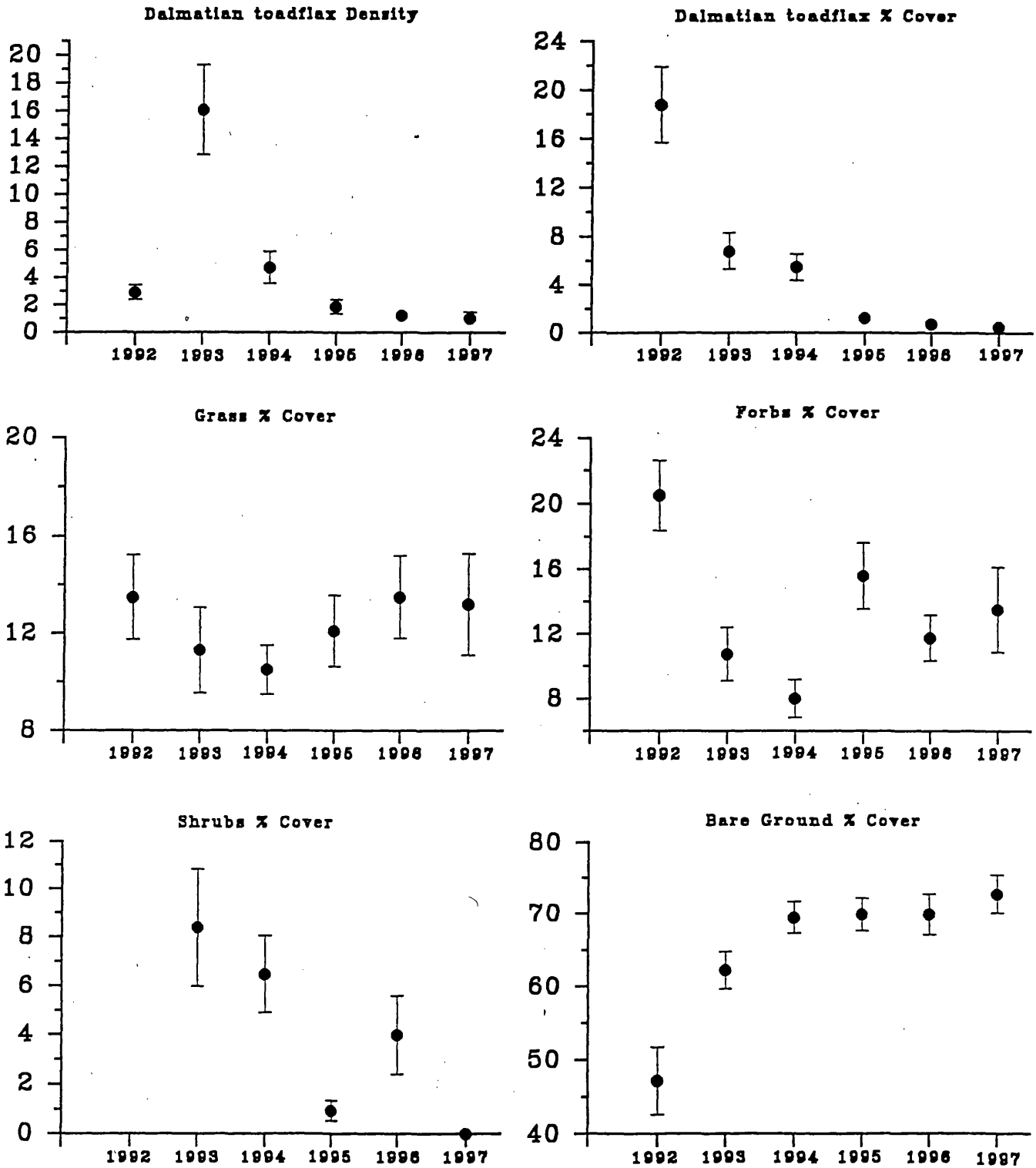
<sup>1</sup>Cover information was obtained from Daubenmire frame samples, each a 0.1 m<sup>2</sup>.

<sup>2</sup>Twenty Daubenmire frame samples were taken at 1 m intervals along the transect.

<sup>3</sup>Numbers are means  $\pm$  the standard error of the means.

Figure 1. Plant Analyses from 1992-1997  
Deer Lodge National Forest Site  
● Transect #1

Means  $\pm$  the Standard Error of the Means



## II. Helena National Forest, Townsend Ranger District, Townsend, MT.

### A. Biological control efforts against Dalmatian toadflax in 1997.

Cooperator: Diane Johnson, Townsend Ranger District, Townsend, MT

Releases of the defoliating moth, *Calophasia lunula*, for biological control of Dalmatian toadflax were continued in 1997 on the Townsend Ranger District. Sufficient numbers of the moth were generated in May to be able to make field releases in early June. Two shipments of *C. lunula* were sent to Diane Johnson for release at Dalmatian toadflax sites of her choice. The first shipment was sent on June 10, 1997 containing 200 larvae, and the second was sent on June 17, 1997 containing 500 larvae.

Release of the flower-feeding beetle, *Brachypterolus pulicarius* were continued in 1997 on the Townsend Ranger District. Efforts to collect *B. pulicarius* from toadflax sites in Montana in mid summer were highly successful. One-thousand adult *B. pulicarius* were shipped to Diane Johnson on July 23, 1997 for release on the Townsend Ranger District, to supplement releases made in previous years.

In 1996 five new biocontrol agents from Europe were approved for release for the biological control of Dalmatian toadflax in the state of Montana. These five new insects included; a stem-boring weevil *Mecinus janthinus*, two root-boring moths *Eteobalea serratella* and *Eteobalea intermediella*, a root-galling weevil *Gymnetron linariae*, and a seed-feeding weevil *Gymnetron antirrhini*. For the 1997 field season, shipments of these new insects from Europe started to arrive in Bozeman, MT in early June. Upon arriving a sample of insects taken from those sent were checked to make sure that they were parasite and disease free before release. The number of insects to be released, as well as the number of release sites were based on availability of the insects from Europe.

On July 11, 1997 fifty adult *Mecinus janthinus* were delivered to Diane Johnson for release on the Townsend Ranger District. Adult weevils of *M. janthinus* feed on leaves and stems of Dalmatian toadflax plants. Adult weevils create small holes in the shoots in which eggs are laid. After hatching the larvae mine the inside of the shoots causing the portion of the shoot above the feeding damage to prematurely wilt, and suppresses flower formation. *M. janthinus* has only one generation per year.

On August 26, 1997 56 eggs of the root-boring moth *Eteobalea serratella* were released on Dalmatian toadflax plants near Magpie Gulch north of Townsend, MT. All 56 eggs were placed on Dalmatian toadflax plants. After the eggs of *E. serratella* hatch the larvae eat their way into the stem and work down to the root crown where they feed, causing substantial damage to the root system. *E. serratella* have only one generation per year. Over wintering occurs in the larval stage. After wintering in the root the larvae pupate, and emerge in the spring as adult moths to lay eggs. No evidence of overwintering survival of *E. serratella* was found at the Aldritch Gulch site were they had been released the previous year.



Plant vegetation analyses were conducted at the Townsend Ranger District site in 1997, so that the impact of the biological control agents on Dalmatian toadflax could be documented in the future. Twenty Daubenmire frame samples, each a tenth of a square meter, were taken along each of two, 20 meter transects at one meter intervals for a total of 40 plant samples. Plant information taken included the density of Dalmatian toadflax, percent cover of Dalmatian toadflax, grasses, forbs, shrubs, and percent bare ground (Table 2). Comparisons of the means for the six informational categories over the past two years are depicted in Figure 2.

B. Biological control efforts against leafy spurge.

On July 8, 1997, and July 17, 1997, 3,000 and 6,000 flea beetles (*Aphthona nigriscutis*), respectively, were collected from our insectary sites and shipped to Diane Johnson for release against leafy spurge.

Table 2. Density and/or percent cover estimates of Dalmatian toadflax, grasses, forbs, shrubs and bare ground at the Townsend Ranger District site summer, 1997.

Transect	D. toadflax density	D. Toadflax % cover <sup>1</sup>	Grass % cover	Forb % cover	Shrub % cover	Bare Ground % cover
One <sup>2</sup>	6.50 $\pm$ 1.34 <sup>3</sup>	6.60 $\pm$ 1.52	8.10 $\pm$ 1.02	9.75 $\pm$ 1.52	9.50 $\pm$ 2.85	64.05 $\pm$ 3.23
Two	4.75 $\pm$ 0.50	9.05 $\pm$ 0.91	12.75 $\pm$ 1.38	11.25 $\pm$ 1.92	3.75 $\pm$ 1.25	63.70 $\pm$ 2.91

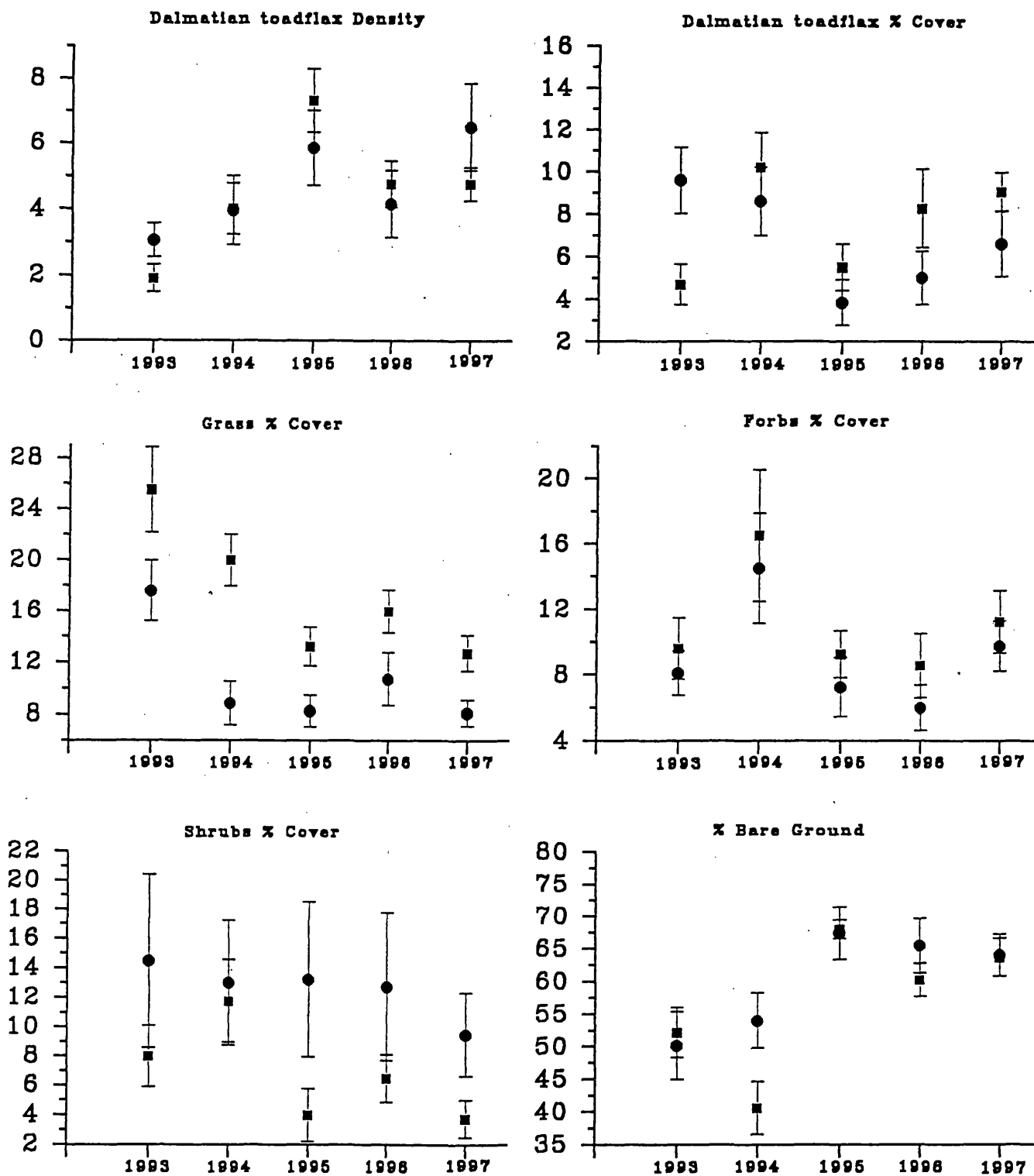
<sup>1</sup>Cover information was obtained from Daubenmire frame samples, each a 0.1 m<sup>2</sup>.

<sup>2</sup>Twenty Daubenmire frame samples were taken at 1 m intervals along each transect.

<sup>3</sup>Numbers are means  $\pm$  the standard error of the means.

Figure 2. Plant Analyses from 1993-1997  
 Townsend Ranger District Site  
 ● Transect #1  
 ■ Transect #2

Means  $\pm$  the Standard Error of the Means





### III. Coconino National Forest, Mormon Lake Ranger District, Flagstaff, AZ.

#### A. Biological control efforts against Dalmatian toadflax in 1997.

Cooperator: Buck Wickham, Mormon Lake Ranger District, Flagstaff, AZ

Releases of the defoliating moth, *Calophasia lunula* for the biological control of Dalmatian toadflax were continued in 1997 on the Mormon Lake Ranger District. Sufficient numbers of the moth were generated in May to be able to make a field release in early June. Two shipments of *C. lunula* larvae were sent to Buck Wickham for release on Dalmatian toadflax sites of his choice. The first shipment, sent on June 10, 1997, contained 250 *C. lunula* larvae, and the second sent on June 16, 1997 contained 750 *C. lunula* larvae.

Releases of the flower-feeding beetles, *Brachypterolus pulicarius*, were continued in 1997 on the Mormon Lake Ranger District. Efforts to collect *B. pulicarius* from toadflax sites in Montana in mid-summer were highly successful. Eleven-hundred adult *B. pulicarius* were sent to Buck Wickham on July 23, 1997 for release on Dalmatian toadflax sites of his choice.

IV. Humboldt National Forest, Ruby Mountain Ranger District, Elko, NV.

A. Biological control efforts against Dalmatian toadflax in 1997.

Upon request from the Ruby Mountain Ranger District, 700 larvae of the defoliating moth, *Calophasia lunula*, were shipped to Elko, NV for release against Dalmatian toadflax.